

Application No. 10/029,282
Amendment dated: February 15, 2006
Reply to Office Action of November 15, 2005

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Original) A method of implementing programmable optical add/drop multiplexing, the method comprising:
 - de-multiplexing, for each one of N optical systems, a respective input WDM (wavelength division multiplexed) optical signal into a plurality of optical path signals each comprising at least one channel;
 - performing an add/drop function of selected ones of the optical path signals and establishing through paths of remaining ones of the optical path signals;
 - multiplexing, for each one of the N optical systems, a plurality of optical path signals into an output WDM optical signal; and
 - performing at least one of chromatic dispersion compensation, slope of dispersion compensation and amplitude compensation wherein for each one of the N optical systems, a respective at least one of chromatic dispersion, slope of dispersion and amplitude of the output WDM optical signal is independent of the add/drop function and corresponds to a target value.
2. (Original) A method of implementing programmable optical add/drop multiplexing of N input WDM optical signals in an optical system, the method comprising:
 - introducing one or more dead-bands in each one of the N input WDM optical signals;
 - de-multiplexing each one of the N input WDM optical signals into a plurality of optical path signals each comprising at least one channel, wherein one or more of the dead-bands are between two or more of the plurality of optical path signals;
 - performing an add/drop function of selected ones of the optical path signals and establishing through paths of remaining ones of the optical path signals; and
 - multiplexing respective ones of the optical path signals into N output WDM optical signals after the performing an add/drop function and the establishing through paths.
3. (cancelled)

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4. (cancelled)

5. (Original) A method according to claim 31 wherein the input WDM optical signals each carry a plurality of dead-bands in a manner that channels of concurrent optical path signals of the optical path signals are separated by a respective one or more of the plurality of dead-bands, thereby resulting in mitigation of filtering penalties in de-multiplexing the input WDM optical signals and reducing cross-talk between the concurrent optical path signals.

6. (cancelled)

7. (Previously Amended) A method of implementing programmable optical add/drop multiplexing, the method comprising;
de-multiplexing, for each one of N optical systems, a respective input WDM optical signal into a plurality of optical path signals each comprising at least one channel;
performing an add/drop function of selected ones of the optical path signals and establishing through paths of remaining ones of the optical path signals;
multiplexing, for each one of the N optical systems, a plurality of optical path signals into an output WDM optical signal; and
performing chromatic dispersion compensation, wherein for each one of the output WDM optical signals of the N optical systems, the chromatic dispersion corresponds to a target value which is suitable for transmission requirements of a respective one of the N optical systems and wherein the target value is independent of the add/drop function.

8. (Original) A method according to claim 7 wherein the performing chromatic dispersion compensation comprises performing preliminary chromatic dispersion compensation and slope of dispersion compensation for each one of the input WDM optical signals of the N optical systems, wherein the input WDM optical signals are set to have common values of chromatic dispersion and slope of dispersion.

9. (Original) A method according to claim 7 wherein the performing chromatic dispersion compensation comprises performing output chromatic dispersion compensation

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and slope of dispersion compensation for at least one of the output WDM optical signals of the N optical systems, wherein for the at least one of the output WDM optical signals of the N optical systems the chromatic dispersion and the slope of dispersion are set to have target values of chromatic dispersion and slope of dispersion, respectively, which are suitable for transmission requirements of a respective one of the N optical systems.

10. (Original) A method according to claim 7 wherein the performing chromatic dispersion compensation comprises performing secondary chromatic dispersion and slope of dispersion compensation for at least one optical path signal of each one of at least N-1 optical systems of the N optical systems, wherein respective optical path signals of the N-1 optical systems are set to have common values of chromatic dispersion and slope of dispersion.

11. (Original) A method according to claim 7 wherein the performing chromatic dispersion compensation comprises performing secondary chromatic dispersion and slope of dispersion compensation for at least one optical path signal of each of the input WDM optical signals of the N optical systems, wherein the chromatic dispersions and slopes of dispersion of the at least one optical path signal of each one of the input WDM optical signals of the N optical systems are set to have common values of chromatic dispersion and slope of dispersion.

12. (Original) A method according to claim 31 comprising performing amplitude compensation, wherein for each one of the output WDM optical signals of the N optical systems the power corresponds to target values which are suitable for transmission requirements of a respective one of the N optical systems and independent of the add/drop function.

13. (Original) A method according to claim 12 wherein the performing amplitude compensation comprises performing amplification of each one of the input WDM optical signals of the N optical systems, wherein the power of each one of the input WDM optical signals of the N optical systems is set to a common value.

14. (Original) A method according to claim 12 wherein the performing amplitude compensation comprises performing amplification of each one of the output WDM optical

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signals of the N optical systems, wherein for each one of the output WDM optical signals of the N optical systems, the power is set to a target value which is suitable for transmission requirements of a respective one of the N optical systems.

15. (Original) A method according to claim 12 wherein the performing amplitude compensation comprises performing amplitude compensation of at least one of the optical path signals of each one of the N optical systems, wherein for respective ones of the optical path signals of the N optical systems the power is set to a specific common value.

16. (cancelled)

17. (Original) A programmable optical add/drop multiplexer (OADM) comprising: two or more OADM elements wherein each one of the OADM elements comprises a de-multiplexer (DeMUX) and a multiplexer (MUX) connected through a plurality of paths, wherein the DeMUX is adapted to de-multiplex an input WDM optical signal into a plurality of optical path signals each propagating through a respective one of the paths, and wherein the MUX is adapted to multiplex a plurality of optical path signals into an output WDM optical signal;

a plurality of switches each connected to respective ones of the paths of the two or more OADM elements, wherein the switches are adapted to perform an add/drop function of selected ones of the optical path signals of the two or more OADM elements and establish through paths of remaining ones of the optical path signals of the two or more OADM elements; and

at least one of a plurality of dispersion and slope of dispersion compensation modules (DSCMs), a plurality of optical amplifiers and a plurality of variable gain control elements (VGCEs), wherein the DSCMs are adapted to perform at least one of dispersion compensation and slope of dispersion compensation in a manner that, for each one of the two or more OADM elements, the dispersion and slope of dispersion, respectively, of the output WDM optical signal is independent of the state of the switches and wherein the optical amplifiers and the VGCEs are adapted to perform amplitude compensation in a manner that, for each one of the two or more OADM elements, the amplitude of the output WDM optical signal is independent of the state of the switches.

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18. (Original) An optical system comprising:
at least one transmitter adapted to generate optical signals each comprising
one or more channel wherein channel frequencies at which the optical signals are generated
are limited to provide dead-bands; and
a programmable optical add/drop multiplexer (OADM) comprising:
two or more OADM elements wherein each one of the OADM elements
comprises a DeMUX and a MUX connected through a plurality of paths, wherein the DeMUX
is adapted to de-multiplex an input WDM optical signal into a plurality of optical path signals
with at least one of the dead-bands between at least two of the optical path signals, each one
of the optical path signals propagating through a respective one of the paths, and wherein the
MUX is adapted to multiplex a plurality of optical path signals into an output WDM optical
signal; and
a plurality of switches each connected to respective ones of the paths of the
two or more OADM elements, wherein the switches are adapted to perform an add/drop
function of selected ones of the optical path signals of the two or more OADM elements and
establish through paths of remaining ones of the optical path signals of the two or more OADM
elements.
19. (Original) A programmable OADM comprising:
two or more OADM elements wherein each one of the OADM elements
comprises a DeMUX and a MUX connected through a plurality of paths, wherein the DeMUX
is adapted to de-multiplex an input WDM optical signal into a plurality of optical path signals
each propagating through a respective one of the paths, and wherein the MUX is adapted to
multiplex a plurality of optical path signals into an output WDM optical signal;
a plurality of switches each connected to respective ones of the paths of the
two or more OADM elements, wherein the switches are adapted to perform add/drop function
of selected ones of the optical path signals of the two or more OADM elements and establish
through paths of remaining ones of the optical path signals of the two or more OADM
elements; and
optical path length means for reducing effects of coherent cross-talk between
the optical path signals.
20. (cancelled)

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21. (cancelled)

22. (cancelled)

23. (Original) A programmable OADM according to claim 19 wherein the optical path means for reducing effects of coherent cross-talk comprises applying the programmable OADM to input WDM optical signals each carrying a plurality of dead-bands in a manner that channels of concurrent optical path signals of the optical path signals are separated by a respective one or more of the plurality of dead-bands, thereby resulting in mitigation of filtering penalties in de-multiplexing the input WDM optical signals and reducing coherent cross-talk between the concurrent optical path signals.

24. (Original) A programmable OADM according to claim 19 further comprising means for chromatic dispersion compensation connected to at least one of the two or more OADM elements, wherein the chromatic dispersion of each one of the output WDM signals corresponds to a respective target value and is independent of the state of the switches.

25. (Original) A programmable OADM according to claim 24 wherein the means for chromatic dispersion compensation comprises, for each one of the two or more OADM elements, a primary DSCM connected to a respective one of the DeMUXs, wherein the primary DSCM is adapted to perform chromatic dispersion and slope of dispersion compensation of a respective one of the input WDM optical signals, wherein the chromatic dispersion and slope of dispersion of each one of the input WDM optical signals is set to a common value of chromatic dispersion and slope of dispersion, respectively.

26. (Original) A programmable OADM according to claim 24 wherein the means for chromatic dispersion compensation comprises, for at least one of the two or more OADM elements, an output DSCM connected to a respective one of the MUXs, wherein the output DSCM is adapted to perform chromatic dispersion compensation of a respective one of the output WDM optical signals, wherein the chromatic dispersion of the respective one of the output WDM optical signals is set to a respective target value of chromatic dispersion.

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27. (Original) A programmable OADM according to claim 26 wherein the output DSCM is further adapted to perform slope of dispersion compensation of the respective one of the output WDM optical signals, wherein the slope of dispersion of the respective one of the output WDM optical signals is set to a respective target value of slope of dispersion.

28. (cancelled)

29. (Original) A programmable OADM according to claim 24 wherein the means for chromatic dispersion compensation comprises one or more secondary DSCMs in each one of the two or more OADM elements, wherein the secondary DSCMs are connected through a respective one of the paths and wherein the secondary DSCMs are adapted to perform secondary chromatic dispersion and slope of dispersion compensation of respective ones of the optical path signals, wherein the chromatic dispersion and slope of dispersion of the respective ones of the optical path signals are set to common values of chromatic dispersion and slope of dispersion, respectively.

30. (Original) A programmable OADM according to claim 19 comprising means for amplitude compensation, wherein the power of the output WDM signals of the two or more OADM elements is independent of the state of the switches.

31. (Original) A programmable OADM according to claim 30 wherein the means for amplitude compensation comprises, for each one of the two or more OADM elements, an input amplifier connected to a respective one of the DeMUXs, wherein the input amplifier is adapted to amplify a respective one of the input WDM optical signals, wherein the powers of the input WDM optical signals are set to a common value.

32. (Original) A programmable OADM according to claim 30 wherein the means for amplitude compensation comprises, for each one of the two or more OADM elements, an output amplifier connected to a respective one of the MUXs, wherein the output amplifier is adapted to amplify a respective one of the output WDM optical signals to a required target value of power that satisfies transmission requirements of an optical system associated with a respective one of the two or more OADM elements.

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33. (Original) A programmable OADM according to claim 30 wherein the means for amplitude compensation comprises a plurality of VGCEs each connected through a respective one of the paths of the two or more OADM elements, each one of the VGCEs being adapted to perform amplitude compensation of a respective one of the optical path signals, wherein the powers of the respective ones of the optical path signals are set to a common value.

34. (Original) A programmable OADM according to claim 33 wherein at least one of the VGCEs is adapted to perform a mute function of a respective one of the optical path signals.